

JUL 31 2006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Jeffrey Allen Neilsen, et al      Examiner: Leo B. Tentoni  
Serial No.: 10/603,896      Group Art Unit: 1732  
Filed: June 24, 2003      Docket: 100201650-1  
Title: METHODS AND SYSTEMS FOR PRODUCING IMPROVED COLORING  
IN AN OBJECT PRODUCED THROUGH SOLID FREEFORM  
FABRICATION

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1. Transmittal of Appeal Brief (1 pg.).
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Respectfully submitted,

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Date: July 31 2006  
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By: Matthew B. McNutt  
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**PATENT APPLICATION**ATTORNEY DOCKET NO. 100201650-1**IN THE****UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor(s): Jeffrey Allen Nelsen, et al

Confirmation No.: 4887

Application No.: 10/603,896

Examiner: Leo B. Tentoni

Filing Date: June 24, 2003

Group Art Unit: 1732

Title: **METHODS AND SYSTEMS FOR PRODUCING IMPROVED COLORING IN AN OBJECT PRODUCED THROUGH SOLID FREEFORM FABRICATION**

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**TRANSMITTAL OF APPEAL BRIEF**

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on June 12, 2006.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) \$500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

(a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:

<input type="checkbox"/> 1st Month \$120	<input type="checkbox"/> 2nd Month \$450	<input type="checkbox"/> 3rd Month \$1020	<input type="checkbox"/> 4th Month \$1590
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The extension fee has already been filed in this application.

(b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 08-2025 the sum of \$ 500. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

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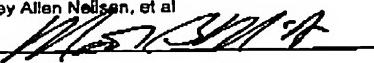
Date of facsimile: July 31, 2006

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Respectfully submitted,

Jeffrey Allen Nelsen, et al

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Jeffrey Allen Neilsen et al.

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Serial No.: 10/603,896

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Title: METHODS AND SYSTEMS FOR PRODUCING IMPROVED COLORING  
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**APPEAL BRIEF**

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**CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR § 1.8(a)]**

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July 31, 2006

Date



Signed by: Matthew B. McNutt

Dear Sir:

This is an appeal from the Office Action mailed on March 14, 2006, finally rejecting claims 1-19.

A Response Under 37 C.F.R. 1.116 was mailed on May 3, 2006, and received in the USPTO on May 8, 2006.

An Advisory Action mailed May 17, 2006, maintained the finality of the rejection of claims 1-19

A Notice of Appeal in this application was mailed on June 12, 2006, and was received in the USPTO on June 15, 2006.

The fee required under 37 CFR § 41.20(b)(2) for filing an appeal brief should be charged to Deposit Account No. 08-2025.

Appellants request the opportunity for a personal appearance before the Board of Appeals to argue the issues of this appeal. The fee for the personal appearance will be timely paid upon receipt of the Examiner's Answer.

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Applicant: Jeffrey Allen Neilsen et al.  
Serial No.: 10/603,896

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**I. REAL PARTY IN INTEREST**

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

**II. RELATED APPEALS AND INTERFERENCES**

Appellant is unaware of other prior or pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in this Appeal.

**III. STATUS OF CLAIMS**

Claims 1-47 are pending. Claims 20-47 have been withdrawn from consideration pursuant to 37 CFR 1.142(b) as being drawn to a non-elected invention. Claims 1-19 have been finally rejected and are being appealed.

**IV. STATUS OF AMENDMENTS**

No amendments have been filed after the final rejection.

**V. SUMMARY OF CLAIMED SUBJECT MATTER**

The Summary is set forth as an exemplary embodiment of the language corresponding to independent claim 1. Discussions about elements of claim 1 can be found at least at the cited locations in the specification and drawings.

The present invention, as claimed in independent claim 1, provides a method of improving color quality in an object created by a solid freeform fabrication system that uses a fluid ejection process to build successive layers of the object being fabricated. The method comprises ejecting a first material to form a layer of a three-dimensional object. The first material contains a colorant. A reaction is caused that keeps the colorant near a surface of the object.

Illustrative implementations of the subject matter of claim 1 are described in the specification, e.g., at p. 9, line 5 through p. 13, line 5, and Figs. 2-5.

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**VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

Claims 1-19 stand rejected under 35 U.S.C. §103(a) as purportedly being unpatentable over Jang et al. (U.S. Patent No. 6,401,002 B1) in combination with Shields et al. (U.S. Patent No. 5,181,045 A).

**VII. ARGUMENT**

Claims 1-19 stand rejected under 35 U.S.C. §103(a) as purportedly being unpatentable over Jang et al. (U.S. Patent No. 6,401,002 B1) in combination with Shields et al. (U.S. Patent No. 5,181,045 A).

Appellants assert that the rejection of claims 1-19 under 35 USC § 103(a) should be reversed based on the following.

In maintaining the rejection of claims 1-19 over Jang et al. in combination with Shields et al., the Final Office Action relies on reasons originally made of record in the Office Action mailed October 12, 2005 (Final Office Action, para. 5). The Office Action mailed October 12, 2005, states in part:

Jang et al (see the entire document, in particular, col. 5, lines 45-54; col. 7, lines 30-40; col. 8, lines 27-39) teach a solid freeform fabrication process of making an object by ejecting a first material containing a colorant as claimed, except that Jang et al do not explicitly teach causing a reaction that keeps the colorant near the surface of the object, which is taught by Shields et al (see the entire document, in particular, col. 2, lines 1-11; col. 2, line 26 to col. 3, line 44) . . . (note that Shields et al . . . teach causing a reaction that keeps the colorant near a surface of the formed object (by "crashing" or precipitating the colorant out of the material)) and such would have been obvious to one of ordinary skill in the art at the time the invention was made in the process of Jang et al in view of . . . Shields et al . . . principally in order to provide an object having a desired color.

(Office Action mailed October 12, 2005, at page 6, lines 7-23).

The Final Office Action also states in part:

. . . Shields et al. teach 'crashing' or precipitating a colorant out of a material, which will keep a colorant near a surface of a formed object (note page 8, lines 1-18 of the instant specification). While Shields et al. may also be concerned with a different problem (i.e., preventing or reducing the mixing of two different ink colors at a common border of the two inks), this does not in any way diminish the teaching of Shields et al., and one of ordinary skill in the art

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would look to Jang et al. and Shields et al. for teachings on how to provide an object having a desired color.

(Final Office Action, para. 7).

Referring to Section 706.02(j) of the MPEP, to establish a *prima facie* case of obviousness, three basic criteria must be met:

- (1) There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference to combine reference teachings;
- (2) There must be reasonable expectation of success;
- (3) The prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on Appellant's disclosure. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (F.E.D. Cir. 1991).

Appellants respectfully submit that the combination of Jang et al. and Shields et al. cannot support a case of *prima facie* obviousness as to claims 1-19 because, among other possible reasons, the references fail to disclose all of the elements of the present invention, there is no motivation to combine the reference teachings, and one skilled in the art would have no reasonable expectation of success when combining the references as suggested in the Final Office Action.

Jang et al. teach a freeform fabrication process having several different embodiments. The process includes depositing a solidifiable liquid composition (also referred to in Jang et al. as a "baseline material" and also as a "body-building material") such as adhesives, waxes, thermoplastic polymers, etc., that becomes the primary constituent material in the object being formed. In one embodiment, the solidifiable liquid composition contains a colorant already mixed in. (Jang et al, col. 8, lines 45-47). In another embodiment, a selected color ink is mixed with the liquid composition just prior to being deposited. (Jang et al, col. 8, lines 31-33). In other embodiments, droplets of the baseline material are deposited simultaneously or sequentially with the droplets of a color ink. (Jang et al, col. 8, lines 33-35).

With respect to the embodiments of Jang et al. in which the droplets of the baseline material are deposited simultaneously or sequentially with the droplets of a color ink, clearly Jang et al. fail to teach at least the claim element "ejecting a first material to form a layer of a three-dimensional object, the first material containing a colorant", as the baseline material of

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Jang et al. does not contain a colorant in those embodiments. Shields et al. fail to remedy this deficiency of Jang et al., as Shields et al. also fail to disclose “ejecting a first material to form a layer of a three-dimensional object, the first material containing a colorant.”

With respect to the embodiments of Jang et al. in which the solidifiable liquid composition contains a colorant already mixed in, or a selected color ink is mixed with the liquid composition just prior to being deposited, the Final Office Action acknowledges that Jang et al. fail to teach causing a reaction that keeps the colorant near the surface of the object. (Final Office Action, para. 5; Office Action mailed October 12, 2005, at page 6, lines 7-23). The Final Office Action alleges that Shields et al. teach causing a reaction that keeps the colorant near a surface of the formed object, and that one of ordinary skill in the art would use such a reaction in the process of Jang et al. in order to provide an object having a desired color. (Final Office Action, para. 7)

Appellants respectfully disagree with the characterization of Shields et al. as set forth in the Final Office Action, and submit that Shields et al. in fact fail to remedy the acknowledged deficiencies of Jang et al. Shields et al. teach pH-sensitive ink compositions with improved ability to resist mixing of one color with another color when both colors are printed in close succession on a print medium such as paper. (Shields et al., col. 2, line 57 to col. 3, line 1). In particular, Shields et al. teach that by forcing a dye to become insoluble, migration of the dye will be inhibited and bleed between different colors will be reduced. (Shields, et al., col. 2, lines 32-36). Thus, when inks of two different colors are printed next to each other, the border between the two colors remains clean and free from the invasion of one color into the other. (Shields et al., col. 1, lines 47-57). Put another way, Shields et al. teach a method for preventing or reducing mixing of two different ink colors at a common border of the two inks. (Shields et al., col. 2, line 66 through col. 3, line 1).

However, Appellants respectfully submit that forcing dyes to become insoluble at a common border to prevent mixing of two different ink colors on a print medium is not the same as causing a reaction that keeps a colorant near a surface of a three-dimensional object, as set forth in claim 1 of the instant application. Shields et al. are concerned only with the border shared by two adjacent inks. Shields et al. make no teaching or suggestion regarding keeping colorant of the inks near a surface of the print medium (e.g., the surface of the paper). Rather, Shields et al. are indifferent as to the location or migration of the dyes except for along a common border between two different ink colors. In fact, dyes in Shields et al. are free to migrate *away from* the common border. Thus, Appellants

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respectfully submit that even if the teachings of Jang et al. and Shields et al. were combined, at best the result would be that colorants in the material of Jang et al. would be prevented from migrating into colors of adjacent layers of the object. This is not the same as keeping the colorant near a surface of the object, as the modified process of Jang et al. would still permit colorants to migrate into the deposited layer and away from the surface of the object. Appellants respectfully submit it is only the instant application that teaches causing a reaction that keeps the colorant near a surface of the object. For at least these reasons, the combination of Jang et al. and Shields et al. fails to teach or suggest all the limitations of claim 1 of the instant application.

In addition, contrary to the position set forth by the Examiner, Appellants respectfully submit that there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify and combine the references as suggested in the Final Office Action. Further, Appellants submit that the knowledge generally available to one of ordinary skill in the art and the teachings of the cited references themselves would lead one skilled in the art to believe there was no reasonable expectation of success if the references were combined as suggested in the Final Office Action.

In another patent to Jang et al. (U.S. Patent No. 6,165,406, filed May 27, 1999), it is noted that earlier patents "failed to recognize critical differences between traditional 2-D color inkjet printing and 3-D inkjet-based [rapid prototyping] processes." (Jang et al. '406, col. 6, lines 29-31). Thus, Jang et al. '406 teaches one skilled in the art that 2-D printing techniques (as taught in Shields et al., for example) are not necessarily useful or applicable to 3-D rapid prototyping processes. Notably, the Jang et al. '002 patent applied in the final rejection was filed *before* the Jang et al. '406 patent quoted above.

Shields et al. teaches that seemingly similar problems (such as waterfastness and bleed resistance) may not necessarily be overcome with similar solutions, noting, "Having solved one problem does not imply a solution to the other." (Shields et al., col. 2, lines 59-61). Thus, one skilled in the art would understand that the Shields et al. method to increase bleed resistance at the border of two inks does not necessarily imply a solution for causing a reaction that keeps a colorant near a surface of a 3-D object.

For at least these reasons, one skilled in the art would not combine and modify the references as suggested in the Final Office Action, and one skilled in the art would have no

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reasonable expectation of success if the references are combined as suggested in the Final Office Action.

For at least the reasons provided above, the combination of Jang et al. and Shields et al. cannot support a 35 U.S.C. 103(a) rejection of claim 1, and withdrawal of the rejection is respectfully requested.

Claims 2-19 each depend, either directly or indirectly, from independent claim 1 which is in allowable condition for at least the reasons set forth above. Accordingly, dependent claims 2-19 are also in allowable condition, and withdrawal of the rejection under 35 U.S.C. §103(a) is respectfully requested.

**VIII. CONCLUSION**

For the foregoing reasons, appellants respectfully submit that the Examiner has erred in rejecting this application. Please reverse the Examiner on all counts.

Any inquiry regarding this Appeal should be directed to either Jeff D. Limon at Telephone No. (541) 715-5979, Facsimile No. (541) 715-8581, or Matthew B. McNutt at Telephone No. (612) 767-2510, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

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Respectfully submitted,  
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By their attorneys,  
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Date: July 31, 2006  
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Applicant: Jeffrey Allen Neilsen et al.  
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**CLAIMS APPENDIX**

1. (Previously Presented) A method of improving color quality in an object created by a solid freeform fabrication system that uses a fluid ejection process to build successive layers of the object being fabricated, the method comprising:
  - ejecting a first material to form a layer of a three-dimensional object, the first material containing a colorant; and
  - causing a reaction that keeps the colorant near a surface of the object.
2. (Original) The method of claim 1, wherein causing a reaction comprises precipitating the colorant out of the first material.
3. (Original) The method of claim 2, wherein causing a reaction further comprises providing a second material to precipitate the colorant out of the first material.
4. (Original) The method of claim 3, wherein ejecting a first material comprises ejecting a binder.
5. (Original) The method of claim 4, wherein providing a second material comprises ejecting a second binder.
6. (Original) The method of claim 4, wherein providing a second material comprises providing a powdered build material into which the first material is ejected.
7. (Original) The method of claim 3, wherein ejecting a first material comprises ejecting a solidifiable build material.
8. (Original) The method of claim 7, wherein providing a second material comprises ejecting a solidifiable support material.
9. (Original) The method of claim 2, wherein causing a reaction to precipitate the colorant out of the first material comprises causing a pH reaction.

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10. (Original) The method of claim 9, wherein the colorant in the first material is sensitive to pH, and wherein causing a pH reaction comprises providing a second material having a pH sufficiently different from a pH of the first material to cause the colorant to precipitate out of the first material upon contact of the first and second materials.

11. (Original) The method of claim 10, wherein the pH of the second material is lower than the pH of the first material.

12. (Original) The method of claim 11, wherein the colorant in the first material is a dye selected from the group consisting of carboxylated azo dyes, carboxylated copper phthalocyanine dyes, carboxylated xanthene dyes, and dyes whose solubility decreases as pH is lowered.

13. (Original) The method of claim 10, wherein the pH of the second material is higher than the pH of the first material.

14. (Original) The method of claim 10, wherein the pH differential between the first material and the second material ranges from about 2.5 to 7 units.

15. (Original) The method of claim 2, wherein causing a reaction to precipitate the colorant out of the first material comprises causing an anionic-cationic reaction.

16. (Original) The method of claim 15, wherein the colorant of the first material is anionic, and wherein causing a reaction comprises providing a cationic second material to cause the colorant to precipitate out of the first material upon contact of the first and second materials.

17. (Original) The method of claim 15, wherein the colorant of the first material is cationic, and wherein causing a reaction comprises providing an anionic second material to cause the colorant to precipitate out of the first material upon contact of the first and second materials.

18. (Original) The method of claim 1, wherein the colorant is a dye.

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19. (Original) The method of claim 1, wherein the colorant is a pigment.
20. (Withdrawn) A solid freeform fabrication system for producing a desired object, the system comprising:
  - a fabrication chamber; and
  - an ejection apparatus for distributing successive layers of ejected material in the fabrication chamber to form the object;
  - wherein the ejected material contains a colorant that precipitates out of the ejected material and remains near a surface of the object.
21. (Withdrawn) The solid freeform fabrication system of claim 20, wherein the ejected material comprises a first material containing the colorant and a second material, the first and second materials reacting to precipitate the colorant out of the first material.
22. (Withdrawn) The solid freeform fabrication system of claim 21, wherein the colorant is sensitive to pH, and wherein the second material has a pH sufficiently different from a pH of the first material to cause the colorant to precipitate out of the first material upon contact of the first and second materials.
23. (Withdrawn) The solid freeform fabrication system of claim 21, wherein the colorant is anionic, and wherein the second material is cationic, such that the colorant precipitates out of the first material upon combining the first and second materials.
24. (Withdrawn) The solid freeform fabrication system of claim 21, wherein the colorant is cationic, and wherein the second material is anionic, such that the colorant precipitates out of the first material upon combining the first and second materials.
25. (Withdrawn) The solid freeform fabrication system of claim 21, wherein the first and second materials comprise binders.
26. (Withdrawn) The solid freeform fabrication system of claim 20, wherein the ejected material comprises a binder.

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27. (Withdrawn) The solid freeform fabrication system of claim 26, further comprising a powdered build material in the fabrication chamber into which the binder is ejected.

28. (Withdrawn) The solid freeform fabrication system of claim 27, wherein the colorant in the binder is sensitive to pH, and wherein the powdered build material has a pH sufficiently different from a pH of the binder to cause the colorant to precipitate out of the binder upon contact of the binder and the powdered build material.

29. (Withdrawn) The method of claim 27, wherein the colorant in the binder is anionic, and wherein the powdered build material is cationic such that the colorant precipitates out of the binder upon contact with the powdered build material.

30. (Withdrawn) The method of claim 27, wherein the colorant in the binder is cationic, and wherein the powdered build material is anionic such that the colorant precipitates out of the binder upon contact with the powdered build material.

31. (Withdrawn) The solid freeform fabrication system of claim 21, wherein the ejected material comprises a solidifiable build material.

32. (Withdrawn) The solid freeform fabrication system of claim 21, wherein the ejection apparatus comprises a drop-on-demand liquid ejection head for ejecting the ejected material.

33. (Withdrawn) The solid freeform fabrication system of claim 32, wherein the drop-on-demand liquid ejection head for ejecting the ejected material includes a plurality of nozzles for ejecting the material.

34. (Withdrawn) A system for producing a desired object by solid freeform fabrication, the system comprising:

means for building a series of successive cross-sections of the object from a build material to form the object; and

means for maintaining a colorant near a surface of the object to produce a desired coloring of the object.

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35. (Withdrawn) The system of claim 34, wherein the means for maintaining comprise precipitating the colorant out of the build material.

36. (Withdrawn) The system of claim 34, wherein the means for maintaining comprise a pH sensitive colorant in a first component of the build material, and a second component of the build material having a pH sufficiently different from a pH of the first component to cause the colorant to precipitate out of the first component upon contact of the first and second components.

37. (Withdrawn) The system of claim 36, wherein the first component is a binder, and the second component is a powdered build material.

38. (Withdrawn) The system of claim 36, wherein the first and second components comprise binders.

39. (Withdrawn) The system of claim 34, wherein the means for maintaining comprise an anionic colorant in a first component of the build material, and a cationic second component of the build material, such that the colorant precipitates out of the first component upon combining the first and second components of the build material.

40. (Withdrawn) The system of claim 39, wherein the first component is a binder, and the second component is a powdered build material.

41. (Withdrawn) The system of claim 39, wherein the first and second components comprise binders.

42. (Withdrawn) The system of claim 34, wherein the means for maintaining comprise an cationic colorant in a first component of the build material, and a antionic second component of the build material, such that the colorant precipitates out of the first component upon combining the first and second components of the build material.

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43. (Withdrawn) The system of claim 42, wherein the first component is a binder, and the second component is a powdered build material.

44. (Withdrawn) The system of claim 42, wherein the first and second components comprise binders.

45. (Withdrawn) The system of claim 34, wherein the means for building comprise means for selectively ejecting binder into a powdered build material.

46. (Withdrawn) The system of claim 34, wherein the means for building comprise means for selectively ejecting a solidifiable build material.

47. (Withdrawn) The system of claim 46, wherein the solidifiable build material is a polymer or pre-polymer.

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**Evidence Appendix under 37 C.F.R. § 41.37(c)(1)(ix)**

There is no extrinsic evidence to be considered in this Appeal. Therefore, no evidence is presented in this Appendix.

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**Related Proceedings Appendix under 37 C.F.R. § 41.37(c)(1)(x)**

There are no related proceedings to be considered in this Appeal. Therefore, no such proceedings are identified in this Appendix.